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ALASKA AGRICULTURAL EXPERIMENT STATIONS
SITKA, ALASKA

Under the supervision of the
UNITED STATES DEPARTMENT OF AGRICULTURE

REPORT OF THE ALASKA AGRICULTURAL EXPERIMENT STATIONS

1927

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ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KODIAK, FAIRBANKS, AND MATANUSKA

[Under the supervision of the Office of Experiment Stations, United States Department of Agriculture]

E. W. ALLEN, *Chief, Office of Experiment Stations.*
WALTER H. EVANS, *Chief, Division of Insular Stations, Office of Experiment Stations.*

STATION STAFF

H. W. ALBERTS, *Director.*[1]
G. W. GASSER, *Assistant in Charge, Fairbanks.*
M. D. SNODGRASS, *Assistant in Charge, Matanuska.*
W. T. WHITE, *Associate Animal Husbandman, Matanuska.*
E. M. FLOYD, *Assistant in Charge, Kodiak.*
E. A. EGGERSGLUESS, *Horticulturist, Sitka.*

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[1]Appointment effective Apr. 1, 1927.

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REPORT OF THE DIRECTOR

H. W. Alberts

INTRODUCTION

The first agricultural experiment station in Alaska was established 30 years ago at Sitka. At that time the majority of the white people of the Territory lived along the southern coast (fig. 1), where the climate and topography are unfavorable to the growth of certain kinds of crops. Experiments at the Sitka station soon showed what crops are adapted to this region. Later, stations were established in suitable agricultural regions in the interior. With the building of the Government railway the Matanuska Valley (figs. 2 and 3), which comprises some of the best agricultural land in the Territory, was opened for settlement, and the Tanana Valley (fig. 4) was made more

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readily accessible to prospective home seekers. Each of these regions has an experiment station where the needs of the surrounding country are under investigation.

FIG. 1.—Homestead near Haines, coast region

FIG. 2.—Tilling soil near Anchorage, coast region

The Matanuska station is in a region where dairying can be made a success. At this station considerable progress has been made in the establishment of a hardy strain of dairy cattle by reciprocally cross-

ing the Galloway with the Holstein-Friesian breed. The crossbreds are good rustlers and well adapted to the climate. Selection breeding is being carried on with the crossbreds to develop a strain combining the milking qualities of the Holstein-Friesians with the vigor

FIG. 3.—Wheat field near Palmer, Matanuska Valley

and rustling ability of the Galloway animals. In milk production the crossbreds do not yet equal the Holsteins but the milk is richer in butterfat. At Matanuska some attention was given to agricultural extension, with the result that a creamery has been opened at Curry.

FIG. 4.—Homestead near Fairbanks

Cream for butter making is shipped semiweekly by the farmers via the railway to Curry, where the creamery is operated by the Government railway in connection with its hotel. Thus a market for dairy products has been established for farmers at all points along the railway. (Fig. 5.) However, the demand for butter will be greater than the supply for some years to come, and the farmers in

the meantime should make a study of the qualities of cattle that are best adapted to the Matanuska region with the view to combining dairying with other activities.

The Fairbanks station is in a region which is suitable for wheat production. More than 40 tons of wheat were milled at the local

FIG. 5.—Farmhouse, Matanuska Valley

flour mill last year. (Fig. 6.) The station is endeavoring to establish a hardy breed of beef cattle by making reciprocal crosses between the Galloway breed and the Asiatic yak. Eight Galloway-yak

FIG. 6.—Flour mill, Fairbanks

calves have so far been dropped by the herd and are in thriving condition. The hybrids feed in the open throughout the year. They browse more readily than the Galloways on young willow trees in

summer and better withstand the rigors of winter. None of the calves has as yet been slaughtered to permit comparison of the carcasses. In conformation the animals are more like the Galloways than the yak. The herd is being increased as rapidly as possible for the purpose of testing its rustling capacity on larger areas of land.

Potatoes are grown in both the Matanuska and the Tanana Valleys, but the market is limited to Alaska. Freight rates prohibit marketing to the States. The many and varied duties of the farmer make it difficult for him to grade his potatoes according to the market standard, and the purchaser who lives at a distance and buys directly from farmers has little assurance as to the quality of the product he will receive. Some system of cooperative marketing is

FIG. 7.—Birch and spruce timber. Good agricultural soil

needed permitting dealers and commission merchants who handle the products for market to inspect and grade the crop carefully according to approved standards. Such a system would enable the farmer to sell the portion of his crop which conforms to the standard, obviate the necessity of his finding a market, and permit him to devote considerable of his time to other farming pursuits.

During the year covered by this report agricultural surveys were made in several parts of the Territory. Strawberry Point (post office, Gustavus), in southeastern Alaska, was found to approximate 40,000 acres of comparatively level topography and to be timbered only in small areas. Homesteaders are raising beef cattle in this region. Another region near Petersburg (Point Agassiz) is making rapid progress in dairying. This vast grassy tide flat is occupied by Scandinavian farmers and their families and embraces an immense grazing tract and enough level land to permit use of haying machinery. Other regions suitable for agriculture were found about

bays and inlets, but they are too remote as yet to permit immediate development. Large areas of land along both shores of the Yukon River in the interior can be put under cultivation as soon as they are needed. (Fig. 7.) An agricultural survey is being planned to determine the grazing possibilities on some of the Aleutian Islands, where both sheep and cattle are raised with apparent success.

SITKA STATION

Experiments at the Sitka station were conducted in horticulture, olericulture, and floriculture. The topographic and climatic conditions of the region are unfavorable for grain growing and livestock raising. Land can be cultivated in small areas only, and the cost of clearing is heavy. Approximately 12 acres of land are under cultivation at present.

The season was favorable for the growing of vegetables, hardy flowers, and some fruit, including berries, apples, and cherries. The average temperature for the winter was considerably lower than that of last year. Frequent alternate freezings and thawings during the winter and spring months caused heaving of the surface soil at the station.

STATION IMPROVEMENTS

A number of improvements were made to the physical plant. Approximately 300 feet of boarding was renewed on an old sidewalk, and a new gravel walk 300 feet long was laid between a strip of sward leading through the apple orchard and flower beds. The walk has improved the appearance of the grounds. On April 5 the propagating house was destroyed by fire, caused presumably by the explosion of gas in the furnace. All the work of the year with plants in the propagating house was lost. The old propagating house was repaired as rapidly as possible, but the work was resumed under many handicaps. The roof on the root house was repapered and given a fresh coat of tar. The roofs on both the superintendent's cottage and the blacksmith shop were shingled and stained.

DISTRIBUTION OF NURSERY STOCK

The station propagated fruit trees, fruit plants, and ornamentals for distribution among the settlers. The following were distributed: Two thousand strawberries, 1,000 raspberries, 500 currants, 250 gooseberries, 150 apple trees, 24 rhubarb plants, 12 horse-radish, and 4 mint plants; and of ornamentals, 150 double-flowered roses and 170 single-flowered, 24 *Spiræa* spp., 24 *Lonicera thibetica*, 12 *L. japonica*, 4 *L. tatarica*, 20 snowberry, 20 weigelia, 20 purple lilacs, 20 perennial phlox, 12 Shasta daisies, 50 foxgloves, and 20 delphiniums.

THE ORCHARD

This year was the most favorable of any year on record for the production of tree fruits.

Apples.—Apples were produced more abundantly than ever before. Thirty varieties are under trial in the station orchard and 105 of the trees are of bearing age. All the trees bloomed, but only 60 per cent of them set fruit. The apples of all the varieties are more elongated

in shape than are those of similar varieties which are grown in the Central and Eastern States. Yellow Transparent, which was mature September 20, is the best for the region. (Fig. 8.) Six small trees of the variety produced 120 pounds of apples. Keswick (Keswick's Codlin) was the heaviest yielder, each of the two trees at the station producing 100 pounds of fruit. Lowland (Livland) Raspberry ranked third in point of yield, producing only small fruit and maturing too late to be of value.

Pears.—The varieties of pears under trial were Koonce, Tyson, and *Pyrus* sp. × Domestica. The latter set fruit for the first time, bearing 12 small pears which failed to mature. The other two varieties did not set fruit.

FIG. 8.—Apple tree of the Yellow Transparent variety, Sitka

Peaches.—Two peach trees have been trained to grow in a sheltered place against a building wall. The Alexander variety produced 17 peaches measuring about 3 inches in diameter. The fruit was fair in flavor and matured from August 20 to September 10. The Triumph variety produced 22 peaches, also about 3 inches in diameter. The fruit was of red color, mealy, and poor in flavor. The fruit was mature by September 13.

Apricots.—The Early Golden variety of apricot tree, which has been trained to grow against a wall in a sheltered place, bloomed but set no fruit.

Plums.—Plum trees bore fruit for the first time at the station. The varieties under trial were Imperial Gage, Reine Claude (Green

Gage), Bradshaw, and *Prunus spinosa* × Domestica. Imperial Gage produced 4 pounds of fruit which was picked October 20. Reine Claude yielded fairly well. Two trees of the Bradshaw variety bore such heavy crops as to cause the limbs to bend under their weight. The plums were of reddish-purple color. *P. spinosa* × Domestica bore only a few small plums which began to crack before ripening. The fruit was of purple color. No plums ripened. Cold weather set in, and it became necessary to pick the plums to obtain any use from them.

Cherries.—Every cherry tree bore fruit this year, whereas only two varieties of cherries were productive last year. (Fig. 9.) The total yield of cherries approximated 50 pounds, and the yield was better

FIG. 9.—Cherry tree, Sitka station

than ever before. Sour-cherry trees outranked sweet-cherry trees in yield. Montmorency was the highest yielder and the fruit was of excellent quality. Early Richmond and Wragg ranked next in production. Republican was the best yielder among the sweet cherries.

Rainy and cloudy weather for a number of days caused the fruit to swell and crack before ripening. Wragg was more affected than were the other varieties.

SMALL FRUITS

Small fruits, including raspberries, currants, and strawberries, produced in abundance.

Raspberries.—Cuthbert is the leading variety of red raspberry at the station. The plants are growing close together in rows 6 feet apart. All canes which bore fruit last year were removed from the

plat and only the strongest of the young canes were retained. In a single row 116 feet long Cuthbert canes yielded 88 quarts, or at the rate of 5,508 quarts of berries per acre. The average yield was about 2,500 quarts of berries per acre. Ranere (St. Regis) is sweeter in flavor and firmer in texture than the Cuthbert, and is likely to prove to be a good shipper. The variety Orange is lighter in color than the Cuthbert and has a sweet flavor. Further testing is necessary to determine the merits of Orange.

Currants.—Of 20 varieties of currants under test at the station 11 are red, 6 are black, and 3 are white. Holland (Long-bunch Holland) is the leading red variety and in a row 24 feet long yielded 15 quarts of fruit, or at the rate of 4,538 quarts per acre. Prince of Wales was the most prolific of the black varieties and in a row 32 feet long yielded 18 quarts of fruit, or at the rate of 4,084 quarts per acre. White Dutch was the highest-yielding white variety, and in a row 20 feet long yielded 9 quarts of fruit, or at the rate of 3,267 quarts per acre.

A fungus (*Botrytis cinerea*) attacked both red and white currants, causing the leaves to wilt in the summer and reducing the size of the fruit.

Gooseberries.—Eleven varieties of gooseberries were tested. Champion was the most prolific variety, yielding in a row 40 feet long 20 quarts of fruit, or at the rate of 3,630 quarts per acre. Downing ranked second in yield. Most of the varieties matured between August 13 and 16.

Blackberries.—Five blackberry plants of the variety Himalaya were tested. The canes grew 8 to 12 feet high and had to be supported with a wire netting. They did not bloom until July 1 and bore heavy crops, very little of which was mature October 10. The variety does not seem to be well adapted to southeastern Alaska.

The Logan plants (Loganberry) only partly succeeded. They produced a little fruit, which began to mature in September. Further experiments are necessary to prove the merits of the Logan.

Strawberries.—The first strawberry blossoms appeared May 11. The varieties matured between July 8 and August 25. Seven hundred and twenty-seven seedling varieties of strawberries were under test. Plants occupying a one-third-acre plat yielded at the rate of 1,080 quarts of berries per acre. President Harding, one of the best varieties, yielded at the rate of 1,200 quarts of berries per acre. A one-third-acre plat on which the plants had either outgrown their usefulness or died was replanted, and over 2,000 plants were transplanted to separate plats for distribution in the spring.

The tender plants were eaten or trampled upon by wild deer early in the spring. A night watchman who was engaged from May 7 to June 7 to patrol the field reported finding as many as seven deer there during one night.

POTATOES

A total of 180 varieties of potatoes, including station seedlings, was under test. Preparatory to planting, the soil was fertilized with barnyard manure and seaweed. The potatoes were practically free from scab and from attack by insect pests. Planting was begun May 7 and completed May 12. The first blossoms appeared July 7,

and some of the varieties blossomed as late as September 16. The varieties American Wonder, Anna, and June produced potatoes for use as early as July 30. Anna and June are station seedlings. Most of the other varieties were dug between October 19 and 27. The average yield of the main crop exceeded 100 bushels per acre.

The potatoes of one variety began to crack after they had been in storage for a week.

ARTICHOKES

The White Jerusalem artichoke is grown at Sitka. The crop was left in the ground all winter and dug April 1. The tubers were planted April 28, and the resulting plants grew 6 feet high and produced tubers averaging 2 inches in diameter. Plants that were cut

FIG. 10.—Vegetable plats, Sitka station

several times during the summer produced comparatively small tubers.

VEGETABLES

Hardy vegetables grow luxuriantly at the station. (Fig. 10.) Lettuce, cabbage, and cauliflower make rapid growth. Early plantings of radish, turnip, cabbage, and cauliflower were attacked by root maggots. Most of the cabbage and cauliflower plants were saved by pouring about them a 5 per cent solution of creolin. Some of the cabbage, cauliflower, and kale plants succumbed to attack by clubroot, a disease due to slime mold (*Plasmodiophora brassicæ*). Other cabbage and cauliflower plants which survived the attack produced heads of fair size.

Beets.—Climatic conditions were favorable to beet production. Four varieties were sown May 12 and were ready for use by July 20. The crop was harvested October 1. Early Wonder produced at the rate of 17 tons per acre.

Brussels sprouts.—This vegetable was sown in the cold frame April 27 and transplanted to the open June 8. Only a few of the plants developed sprouts, because of attack by clubroot.

Carrots.—Danvers Half Long was the only variety of carrot grown. The seed was sown May 11, and the resulting young carrots were ready for use by July 20. The crop was harvested October 1 and yielded at the rate of 15 tons per acre. Carrots for table use should be stored in a cool place under a layer of sand several inches deep. The carrots will not shrink and will remain firm until the late spring.

Cabbage.—The varieties of cabbage tested were Early Summer, Early Jersey Wakefield, Golden Acre, Danish Ballhead, Copenhagen Market, Flat Dutch, and All-Head. Seed was sown in the cold frame April 28, and the resulting young plants were set in the open between June 9 and 15. All early varieties headed well. The late varieties require early seeding in the spring to assure heading in the fall. Early Jersey Wakefield has a tendency to split when it matures, and it fails to keep well in storage.

Cauliflower.—The varieties of cauliflower Snowball, Extra Early Erfurt, and Dry Weather were started in the cold frame, and on June 8, 16, and 28, respectively, were set in the open. The early varieties were ready for use by July 24.

Kale.—The varieties of kale Dwarf Siberian, Dwarf Green Curled, Tall Green Curled, Dwarf Curled Scotch, and Thousand Head were successfully grown. The seed was sown in rows 3 feet apart May 16, and the resulting plants were later thinned to 18 inches apart in the row. Kale is an excellent green vegetable for winter. It can be left in the ground during the winter with no protection other than that afforded by the snow. The texture and flavor of kale are materially improved by frost. For this reason the crop should be planted about June 1 rather than earlier. Early plantings frequently run to seed.

Lettuce.—Both leaf lettuce and head lettuce seed may be sown in the open about May 15 in southeastern Alaska. Head lettuce should be thinned to 8 inches apart in the row.

Onions.—Seven varieties of onion were grown. The best onions were produced from seed. Seed which was sown May 9 produced onions for use September 1. The crop was harvested October 27.

Parsley.—Dwarf Curled parsley was sown May 13, and the resultant plants were ready for use July 15. Parsley can be cut continuously as needed until it freezes out. Parsley can be kept indefinitely when it is artificially dried, and in this form it is frequently used as a flavoring for soups.

Parsnips.—Two varieties of parsnips tried were Short Round French and Improved Guernsey. The former matured the earlier, but the latter produced the higher yield. Part of the crop was dug and stored in dry sand in the root cellar and the rest was left in the ground for use in the spring.

Peas.—The varieties of peas grown were Melting Marrow, Hundredfold, American Champion, Alderman, and Prince Edward.

Melting Marrow and Hundredfold grew to a height of 4 feet and the others to a height of 8 feet. The varieties were sown May 6, and some of the peas reached a usable size by August 5. All the varieties required supports.

Rutabagas.—King of Swedes was the only variety of rutabaga grown. The plants were slightly attacked by root maggots.

Turnips.—The varieties of turnip Petrowski and White Globe were sown about May 15. Petrowski outranked the other in quality and yield. Petrowski is seldom attacked by root maggots, whereas the white varieties are severely attacked by them. Petrowski turnips keep well in storage until about January, when they become pithy. Petrowski yielded at the rate of 18 tons per acre. White Globe yielded at the rate of 13 tons per acre.

Swiss chard.—The varieties of chard Large White Ribbed and Fordhook Giant were planted May 12 and were ready for cutting July 15. They grew to a height of 18 inches and were of fine quality.

Spinach.—Two varieties of spinach tested were Victoria and New Zealand. Victoria has large, tender leaves, and runs to seed very readily. Victoria is finer in quality than New Zealand, but the latter growns for a much longer period before running to seed.

Radish.—Five varieties of radish were grown. Successive seedings were made at 2-week intervals. The June sowings gave better results than the late April and early May sowings. The young plants grow rapidly and produce fine, crisp radishes when the air and the soil warm up. The April sowings were more severely attacked by root maggots than were the June sowings.

Rhubarb.—Rhubarb grew exceptionally well and was of fine quality. The leafstalk measured over an inch in diameter and 3 feet in length. Harvesting was begun early in May and continued throughout the summer.

Herbs.—The seed of herbs sown included borage, coreander, dill, caraway, summer savory, sweet fennel, and sage. All the plants did well. The seed of dill, caraway, and sweet fennel failed to mature.

ORNAMENTALS

Annuals.—Annuals grow luxuriantly at Sitka. Twenty-six varieties were sown May 15. Early growth was retarded by the cool weather in the spring. Baby-blue-eyes was the first variety to blossom (July 1) and balsam was the last (September 15). Other annuals included the aster, Asperula, California poppy, calendula, candytuft, clarkia, chrysanthemum, cockscomb, centaurea, lobelia, larkspur, mignonette, nasturtium, phlox, pansy, Santa Barbara poppy, Shirley poppy, scarlet sage, scabiosa, snapdragon, sweet-scented stocks, sweet peas, verbena, and zinnia.

Perennials.—Perennials bloomed profusely throughout the summer. The varieties grown were *Achillea ptarmica*, *Anthemis tinctoria kelwayi*, bleeding heart, Canterbury bells, columbine, dianthus, delphinium, English daisy, forget-me-not, foxglove, helianthus, Iceland poppy, lychnis, lupine, oriental poppy, peony, phlox, primrose, Shasta daisy, spiræa, snow-on-the-mountain, and sweet william.

Bulbs.—Nearly all the bulbous plants so far introduced have been successful. Crocus was the first flower produced at Sitka this spring.

Dahlias did well but must be experimented with further before their merits can be determined. Of 62 varieties of gladiolus which were planted early in May, only 37 varieties blossomed. The first blossoms appeared September 1 and the last October 19.

Narcissus are very hardy and not particular as to soil requirements. In southeastern Alaska the bulbs should be planted in late September or in October. The plants withstand considerable cold but suffer from alternate freezings and thawings of the ground in winter. At the station the beds are covered with seaweed, and occasionally with spruce boughs, as a protection against frost.

English iris blooms after the daffodils have discontinued blooming. This iris is very attractive but blossoms for a short time only. The Japanese iris is a hardy perennial which blossoms early in the spring. Several of the plants grew undisturbed at the station.

FIG. 11.—Galloway cattle in pasture, Kodiak station

Tulips blossom during May. They are hardy and of easy growth. Twenty-two varieties were grown and blossomed.

More than 30 varieties of ornamental shrubs are under experiment. Only a small number of varieties of roses are hardy in southeastern Alaska. The stems freeze back in winter. The Japanese rose (*Rosa rugosa*) has given the most satisfaction of the ornamentals. *Lonicera thibetica* makes hardy growth at Sitka.

KODIAK STATION

STATION IMPROVEMENTS

Some improvements were made at the station. Two cottages, an office, and a storeroom, pump house, and engine room were painted. The roof of the machine shed was repapered. Three acres of land were cleared to permit use of the mower.

LIVESTOCK

The leading project under way at Kodiak is the breeding of Galloway cattle for distribution to the other stations. Galloways are supplied for cross-breeding with Holstein-Friesian at Matanuska and with the Asiatic yak at Fairbanks. Vast areas of pasture grasses are available in the Kodiak region during the summer, but feed must be supplied the animals during the winter. The native grasses are cured with difficulty because of the heavy rains during the harvesting season. The cattle were left in the pasture until December 16. (Fig. 11.) They were then fed hay in the barn at night until January 26, after which they were given a maintenance ration until May 24, when they were again turned on pasture. All the animals came through the winter in fine condition, and some which were no longer wanted for breeding were sold for beef.

GENERAL CROP WORK

During the growing months of June, July, and August the maximum temperature was 62° F. and the minimum temperature 37°. The mean temperature was 57°, or only 15° above the minimum required for crop growth.

Oats and peas.—The fields were plowed in the fall. Oats at the rate of 80 pounds per acre and Canadian field peas at the rate of 25 pounds per acre were seeded for stock feed between May 4 and 20. Where the ground was wet the oat crop was short in straw, and the peas failed. The oats were barely in the milk stage when they were cut for hay. The ground was soft at the time, and the crop was saved with difficulty. The crop was cut 130 days after seeding and yielded at the rate of only half a ton per acre. Four tons of native hay (1 ton per acre) were put up at the station.

Artichokes.—The White Jerusalem variety of artichokes was planted in the spring and allowed to remain in the ground throughout the winter. The crop showed practically no loss in vitality as a result, but made slow growth and attained a height of only 16 inches. Results so far indicate that the artichoke is not well adapted to Kodiak.

Vegetables.—Lettuce, radishes, rutabagas, and turnips did well at Kodiak, whereas beets, cabbage, peas, and carrots failed. The Irish Cobbler variety of potato produced a good crop on well-drained ridges.

MATANUSKA STATION

WEATHER CONDITIONS

The weather during the 1927 growing season was not so favorable to plant growth as in some other years. Severe weather for two weeks in the late fall of 1926, when the thermometer ranged from +20° to −6° F., caused the ground to freeze deeper than usual. A 12-inch snowfall on December 9 and 10 was followed by frequent light falls during January, February, and March. The snow remained on the ground until April 18, 1927, and retarded the season. March had a mean temperature of 3° and April of 6° less than for the 9-year average. Normal temperatures followed in May and June, but the precipitation was below normal.

Vegetation was slow in starting into growth because of the cool weather late in the spring. As a result of the late thawing there was sufficient moisture in the ground to carry most of the crops over until July 15. Any benefit from the light precipitation during the growing months was offset somewhat by the number of cloudy and partly cloudy days.

On September 2 a light frost occurred in low places and damaged some of the late grain. Killing frosts between September 11 and 16 stopped the growth of all crops except roots, hardy peas, and grasses. Potato vines were frozen to the ground.

The effect of surface packing immediately following seeding could readily be seen this season. Some fields which were not packed produced less than half a crop. The loss of moisture in such fields was so great as to cause a failure of the root crops seeded there.

PASTURE LAND

At present 71 acres of land are in cultivated crops. Twenty-five acres of land were seeded with hay and meadow grasses in the spring, the area now devoted to permanent pasture totaling 32 acres. Most of this land is along steep hillsides.

FEEDING VALUE OF NATIVE BLUETOP GRASS, CALAMAGROSTIS SP.

It is a common practice in parts of Alaska to delay cutting the native grasses until late in the summer on the assumption that a higher yield will be secured and that the hay will have a higher feeding value than if cut earlier. Often rains set in during August and September, and curing hay is very difficult. In order to determine the best stage of growth of bluetop for making hay, samples of the grass were cut at weekly intervals from May 21 to November 12, air dried, and analyzed for the usual feeding-stuffs data. Inasmuch as the station has no laboratory for carrying on chemical work, the Bureau of Chemistry and Soils, United States Department of Agriculture, made the determinations. The cooperation of the bureau in this undertaking is gratefully acknowledged.

TABLE 1.—*Analysis of native bluetop grass, Calamagrostis sp., cut at different stages of growth at the Matanuska station*

Sample No.	Date of harvesting	Height of plants	Description of sample	Loss of weight in air-drying	Air-dried samples				
					Water	Fat	Crude fiber	Protein N×6.25	Ash
	1927	*Inches*		*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
1	May 21	4–10	Practically all leaves	72.7	5.2	3.9	20.0	27.20	10.0
2	May 28	10–14	Stems 4 to 10 inches	77.5	5.3	3.4	25.0	21.05	9.3
3	June 4	10–16	Stems 5 to 12 inches	71.0	5.4	3.1	26.1	18.56	9.5
4	June 11	12–24	Stems 10 to 20 inches	79.1	5.3	2.1	29.1	18.75	9.1
5	June 18	18–26	Stems 10 to 24 inches; heads breaking from boot	69.2	5.1	1.9	34.2	11.25	6.9
6	June 25	24–36	About half heads out of boot	72.2	4.9	1.7	36.4	10.69	6.1
7	July 2	30–38	Half heads purple; 90 per cent headed	74.1	4.8	1.6	38.8	9.26	5.6
8	July 9	30–48	Fully headed, pollen dropping	57.4	4.9	1.8	36.2	6.94	5.0
9	July 17	(1)	Advanced blooming stage; lower stems woody	52.3	5.0	1.6	38.4	5.37	4.4
0	July 23	-------	Seeds forming; few heads in bloom; lower stems woody	56.2	4.8	1.7	35.6	7.31	5.9

[1] Plants after this date were of mature size.

TABLE 1.—*Analysis of native bluetop grass, Calamagrostis sp., cut at different stages of growth at the Matanuska station*—Continued

Sample No.	Date of harvesting	Height of plants	Description of sample	Loss of weight in air-drying	Air-dried samples				
					Water	Fat	Crude fiber	Protein N×6.25	Ash
	1927	*Inches*		*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
11	July 30		Half heads formed seeds	48.6	4.8	2.2	35.7	5.50	4.8
12	Aug. 6		All seeds formed; 5 per cent heads dropped seeds	41.8	5.0	1.6	35.9	5.18	4.1
13	Aug. 13		Seed shattering; lower leaves drying and dropping	39.5	4.8	1.3	35.7	4.37	4.2
14	Aug. 20		75 per cent seed dropped; many heads broken	(2)	5.1	1.5	34.1	3.93	4.0
15	Aug. 27		Seed practically all shattered; many heads dropped	(2)		.8	34.6	3.93	6.0
16	Sept. 3		All seed dropped; lower leaves off; lower stem woody	(2)	5.0	1.8	36.8	4.18	3.7
17	Sept. 10		10 per cent stalks broken	(2)	5.0	1.8	38.8	2.62	4.9
18	Sept. 17		Grass dead from frost; many heads whipped off by wind; stalks broken	(2)	4.8	1.8	40.8	1.93	5.3
19	Oct. 1		Grass brittle; leaves frosted, ready to fall	(2)	5.1	1.6	44.5	1.37	5.6
20	Oct. 15		Grass heavily frosted; brittle leaves dropping rapidly; stalks woody and stiff	(2)	4.9	1.7	41.7	1.50	6.1
21	Oct. 29		Heavy freeze; grass breaking; seed all dropped	(2)	4.8	1.9	42.3	1.81	5.3
22	Nov. 12		Leaves practically gone from lower three-fourths of stalk	(2)	4.6	1.5	41.9	1.25	5.5

[2] Rainy weather made it impracticable to determine water loss in drying.

From Table 1 it may be seen that the native bluetop grass attained its average height in 1927 by July 9, when the plants were 30 to 48 inches tall, were in an advanced stage of blooming, and the lower part of the stems was becoming woody. Seed formation was beginning July 23, when the lower third of the stems had become hard. From that date the crude fiber increased rather regularly because of the greater hardening of the stem. Early in August the seeds began to shatter, and by August 20, 75 per cent of the seed had fallen from the plants. This, in part at least, would account for the quite general lowering of the protein content. Rains and cloudy days set in in August and continued through September, and haymaking then would have been very difficult. The analyses of the samples harvested late in the fall would indicate a very low feeding value.

No palatability or digestion experiments were carried on nor were data obtained on comparative yields. Considering the stage of growth of the plants and their composition, the period from June 25 to July 30 would appear to be the best for haymaking. This is usually a period of light rainfall and clear weather, which should be taken advantage of for haymaking.

GRAIN CROPS

Oats.—Each of eight varieties of oats was seeded on a $\frac{1}{10}$-acre plat to learn which are the most promising kinds for grain production and for forage. (Figs. 12 and 13.)

Climax and Golden Rain ranked first in grain production, yielding at the rate of 76 bushels per acre. Leader ranked first in forage production.

FIG. 12.—Cutting oats, Matanuska station

Barley.—Five barleys of hybrid origin were tested. The light-colored strain of Hybrid No. 19 is susceptible to smut and for the past two years has failed to come up to expectations in yield. It yielded at the rate of only 30 bushels per acre. Hybrid No. 44c is

FIG. 13.—Hay shed, Matanuska station

not early enough to warrant its continuance at Matanuska. Hybrids Nos. 14a and 20b are early strains but poor yielders.

Wheat.—Of 10 varieties of wheat which were grown in increase plats, Irkutsk, Siberian No. 1, Omega, and Ruby are deemed worthy

of further test. Siberian No. 1 made the highest yield, producing at the rate of 28 bushels per acre.

To determine the effect of fertilizer on yield, $\frac{1}{10}$-acre plats of spring wheat were treated with sodium nitrate, potassium sulphate, and tankage. Sodium nitrate was applied at the rate of 200 pounds per acre. The use of fertilizer increased yields but retarded maturity.

The varieties of winter wheat Danish, Oregon–104, and Wisconsin were seeded August 29, 1927, made fair growth, and produced a good stand. The plants were in first-class condition when winter approached.

Rye.—Winter rye, seeded July 1, 1926, was pastured during the fall. Spring growth started May 1 and the plants were 30 inches high by June 15. The rye was ripe August 7.

ROTATION PLATS

In a 5-year rotation, including wheat, peas, barley, oats and vetch, and potatoes, both wheat and barley plats showed an increase in yield over check plats. Potatoes varied too much with seasonal conditions to permit making significant comparisons.

In a 2-year rotation, alternating peas with oats, satisfactory yields were made both by peas for silage and oats for grain.

LEGUMES

Peas.—In a test to determine the effect of rate of seeding on yield, Canadian field peas, sown at the rate of 80 pounds per acre, yielded 920 pounds of peas, whereas those sown at the rate of 90 pounds per acre yielded 695 pounds.

The varieties of peas for canning studied were Alaska, Hustler, Badger, and Horal. Alaska and Hustler bear pods singly at the fifth and sixth nodes, whereas Badger and Horal bear pods in pairs at the ninth to thirteenth nodes, inclusive.

Vetches.—Vetches have been grown extensively in the Matanuska Valley within recent years, principally as a mixture with oats for hay. Attempts to grow vetches for seed resulted in failure this season because the plants did not mature.

Alfalfa.—Twelve strains of alfalfa which were seeded in 1925 came through the winter with a 50 per cent stand and produced some seed pods, most of which were immature when the first frost came September 11.

Clover.—Alsike clover was seeded May 21 both with and without a nurse crop. The plat having no nurse crop was divided, one part being planted with inoculated seed and the other part with seed which was not inoculated. No difference in growth was noticed between inoculated and uninoculated plants. Growth was only fair until the rains came in the fall and only a few of the plants produced seed. The clover which was seeded with oats as a nurse crop made little growth until after the nurse crop was harvested. This year a smaller number of the plants produced seed than previously.

Medium red clover, sown on a half-acre plat without a nurse crop May 22, made a fair stand, but was delayed in starting into growth by the drought.

Dry weather prevented much of the sweet-clover seed from germinating and the crop made little growth until late in the fall. Some of the plants attained a height of 20 inches.

Soy beans.—The varieties of soy beans Early Black, Manchu, and Madson were planted May 25. All blossomed but were killed by the frost of September 11. The plants were 10 to 15 inches high.

POTATOES

Fourteen varieties of potatoes were tested. (Fig. 14.) The leaves and other parts of the vines gave little evidence of disease, but scab was found on the tubers at digging time. Vine growth was normal, but the tubers were late in setting. Several of the varieties matured sufficiently to produce mealy potatoes. Early Market, Early Ohio, and Early Six Weeks matured fully. These varieties bake well and are dependable for the region.

FIG. 14.—Potato field, Matanuska station

Twenty-four hills of each of the varieties Green Mountain, Rural New Yorker, Irish Cobbler, Triumph, and King which were received from the Wisconsin Experiment Station, Spooner, Wis., were planted. The tubers were quartered, and the proximal or stem ends were planted separate from the distal or tip ends. Plants emerged from the distal-end quarters two days earlier than from the proximal-end quarters, but the latter produced the greater number of first-grade potatoes.

Ground for potatoes was plowed late in the fall of 1926, and plantings were made weekly from May 10 to July 25, 1927. The earliest plantings were slow in coming up, requiring 41 days, whereas the plantings of July 18 emerged in 14 days. Soil temperature was an important factor in the emergence of the plants. Maximum yields were obtained from the plantings of May 25. The number of tubers per plant increased with the later planting dates.

In a test in which potato tubers were removed from the root cellar at different intervals to determine the effect of length of sprout on time of emergence and growth of the resulting plant, sprouts were

found to develop more slowly in strong sunlight than in subdued light, and length of sprout beyond one-quarter inch was found to have little effect on time of blossoming or on yield. Plants from tubers having short sprouts (one-fourth inch) required a longer time to emerge from the soil than did those from tubers having long sprouts (3 to 4 inches). There was little difference in the time elapsing from planting to blossoming. The shorter and heavier the sprout, the less was its likelihood of breaking off at planting time. Sprouts were found to toughen when exposed to the sunlight for several days preparatory to planting.

ARTICHOKES

In a part of the field of White Jerusalem artichokes each hill was given a light covering of coarse stable manure late in the fall of 1926. The mulched plants came through the winter in good condition. Tubers ranging from three-fourths of an inch to 1¼ inches in diameter were dug October 1. The tubers had a small amount of soil adhering to them and were not separated from the plants when stored in the root cellar. The tubers were in good condition in the spring of 1927 and when planted produced plants bearing tubers which measured half an inch in diameter.

OTHER ROOT CROPS

Nine varieties of sugar beets were sown May 26. Because of dry weather during the growing season the largest roots had a diameter of only 3 inches. Rains which came in August failed to revive the growth of the plants. The crop was harvested October 5. Mangels, sown May 24, grew rapidly early in the season but discontinued growth during the dry period of July. August showers failed to help them. The crop produced at the rate of only 5 tons per acre. Cutworms destroyed the plants on approximately half an acre. Rutabagas which were sown June 28 made a good growth of tops but failed to develop roots of large diameter. The largest roots were harvested and the rest were pastured.

GRASSES

Slender wheatgrass produced approximately a ton of hay per acre. The grass affords early and late pasture if it is rested during July and August. Horses relish the grass more than do cattle. Brome grass provided early pasture on south-slope lands. It is relished by cattle and can be used to supplement the native pastures. Canadian bluegrass was seeded with a mixture of brome grass, slender wheatgrass, and alsike clover. The mixture made a good stand and provided a good pasture after October 1. Timothy seed received from North Ridgeville, Ohio, was drilled in rows June 14 and gave a good stand. The plants were 20 inches high, and the foliage covered the ground when the ground froze in the fall.

CORN

The corn varieties Golden Glow, Cold Resistant, White Chippewa Flint, Yellow Chippewa Flint, Northwestern Dent, and Northern

Yellow Dent (Wisconsin No. 25) were received from the Wisconsin Agricultural Experiment Station during the year. One row each of Yellow Chippewa Flint and White Chippewa Flint was planted May 30. Tassels appeared August 1 and silks August 20, when the plants were 28 inches tall. In another planting made June 6 the tassels appeared August 6, but silks failed to form. On June 15 each of the varieties was planted in single rows. Cold Resistant, Northwestern Dent, and the two flint varieties began to tassel August 10, but showed no silks.

MISCELLANEOUS HORTICULTURAL NOTES

During the year the station distributed to settlers 57 plants of black, 246 of red, and 140 of white currants, 24 gooseberry plants, 7 apple trees, 216 raspberry plants, 24 rhubarb plants, 15 rose bushes, 5 honeysuckle vines, 6 lilac bushes, and 2,750 strawberry plants.

Strawberry plants survived the winter without protection, except that given by the snow, but gave a low yield of berries.

Raspberries set more fruit this year than ever before at Matanuska. The fruit was comparatively small, however, and many of the berries dried before ripening.

Gooseberries produced fruit in abundance.

Only 20 per cent of the apple-tree seedlings which were planted in the spring of 1926 survived the winter.

VEGETABLES

The vegetable crop was poor. Root maggots attacked radishes, turnips, rutabagas, and cabbage and reduced the yield. Head lettuce did fairly well, and garden peas and carrots produced a good crop. Beans were only partly successful.

FLORICULTURE

Ornamentals which have been found to be hardy at Matanuska include the *Potentilla fruticosa*, spiræa, *Cornus siberica*, *Rosa rugosa*, lilac (a purple variety), *Ribes alpinum*, and *Achillea ptarmica*. The Japanese honeysuckle grew well for a year and then froze back.

LIVESTOCK

Cattle.—Some Holstein, Galloway, Galloway-Holstein crossbred, and Milking Shorthorn cattle are maintained at the Matanuska station. Individual feeding and milk records are being kept of the cows in each breed. During the summer the cattle feed on native pasture and during the winter they are fed hay, grain, and silage which is produced at the station.

The cows in milk were fed a maintenance ration which was calculated monthly, consideration being given to the weight, daily production, and general condition of each animal. Thirty pounds of oat-pea silage, 10 pounds of oat-vetch hay, 8 pounds of mangels, and 5 pounds of concentrated feed (equal parts of rolled oats and crushed barley) were fed per 1,000 pounds of body weight to animals giving 20 pounds of milk containing 3 per cent of butterfat. One pound of concentrated feed was added for each 3 additional pounds of milk

produced, and proportional variations were made in the feed to agree with the actual weight of the cow.

Feeding experiments.—The station conducted several feeding experiments with cattle to determine the value of the native feeds for maintenance, milk production, and fattening.

Test No. 1: During a 120-day period (January 1 to April 30) 10 representative heifers (3 Holstein-Friesians, 4 Galloway-Holstein hybrids, and 3 Shorthorns) were placed on a daily ration composed of 10 pounds of oat straw, 5 pounds of oat-vetch hay, 15 pounds of oat-pea silage, and 8 pounds of mangels, supplemented with pasture for a few hours each day beginning April 1 to April 30. The three Holstein-Friesian cattle were 6 to 25 months old and had an average weight of 688 pounds at the beginning of the test. They made a total gain of 190 pounds, which was an average gain of 63 pounds per head. The four Galloway-Holstein hybrids were 16 to 20 months old and had an average weight of 786 pounds at the beginning of the test. They made a total gain of 355 pounds, which was an average gain of 89 pounds per head. The three Shorthorn cattle were 12 to 21 months old and had an average weight of 856 pounds at the beginning of the test. They showed a total loss of 165 pounds, which was an average loss of 55 pounds per head. Of the three groups, the Shorthorn cattle were in the best condition, being butcher fat, at the beginning of the test. All the animals were kept in stanchions while in the barn.

Test No. 2: During a 91-day period (April 1 to June 30) all the station cattle were placed on pasture supplemented with the ration outlined in test No. 1 (April 1 to April 30). Half portions of the supplementary ration were fed, beginning May 1. The ration was further reduced to a limited nightly allowance May 16 and discontinued altogether June 1. Of the three groups of representative heifers previously used in test No. 1, the Holsteins had an average weight of 750 pounds April 1. They made a total gain of 420 pounds, which was an average gain of 140 pounds per head. The Galloway-Holstein hybrids had an average weight of 830 pounds April 1. They made a total gain of 645 pounds, which was an average gain of 161 pounds per head. The Shorthorns had an average weight of 791 pounds April 1. They made a total gain of 335 pounds, which was an average gain of 112 pounds per head.

Comments on the tests: A comparison of the average loss of the Shorthorn group with the average gain of the Galloway-Holstein group in test No. 1 shows that the former require more feed to keep in thrifty condition than do the latter. This fact is borne out by others who fed the cattle during the past two winters. The results also indicate that the hybrids are hardier than the Holsteins and the Shorthorns used in the test.

For the period as a whole (January 1 to June 30) the Holsteins made an average gain of 202 pounds, the Galloway-Holstein hybrids 205 pounds, and the Shorthorns 47 pounds.

During the 120-day period (January 1 to April 30) the heifers in the three groups consumed per 1,000 pounds of body weight 3,560 pounds of feed (600 pounds of hay, 1,200 pounds of straw, 1,800 pounds of silage, and 960 pounds of roots). The Holsteins and the Galloway-Holstein hybrids made satisfactory gains for the feed fed,

considering the type of animals tested during the 120-day period and the period May 1 to June 30, which is not considered in the 120-day period. The Shorthorns, however, did not gain sufficiently to offset the cost of their feed, even though they were allowed to run on pasture for 60 days. The cost of pasturing could be figured at only a few cents per head, because the pasture was an open range. The feed per 1,000 pounds of body weight cost $43.60. At $0.0436 per pound of average body weight on January 1, the feed for the Holsteins (688 pounds) cost $31, that for the Galloway-Holstein hybrids (786 pounds) $34.28, and that for the Shorthorns (856 pounds) $37.33. Calculated on the basis of the 6-month normal feeding period at Matanuska, the cost of feeding was $46.50 for the Holsteins, $51.42 for the Galloway-Holstein hybrids, and $55.98 for the Shorthorns, which was an average cost per head of $51.30.

In explanation it should be stated that the Holstein cattle have for many years been selected for their hardiness and rustling ability in addition to their milking qualities, points which receive first consideration in breeding hybrids. The Shorthorns, on the other hand, have been closely housed and barn fed since their arrival some five years ago. They are generally thin-coated and short-haired. The barn in which the cattle were housed during the tests is practically a closed shed which is not heated. The difference in gains probably would have been materially lessened had the Shorthorns been fed proportionately larger amounts, or been stabled in a warm barn, or had a hardier strain of Shorthorn been used in the tests. However, the cattle were handled under conditions better than are the average farming conditions at Matanuska, and the results are significant in indicating that hardiness, long hair, and ability to withstand the rigors of winter are desirable characteristics in cattle for Alaska.

The feeding costs should be of interest to settlers who are confronted each fall with the problem of knowing whether to keep yearlings and 2-year-old animals through the winter and pasture the following summer or whether to slaughter as the animals come off pasture. The costs show that unless gains can be more economically made than were made in the tests, or cheaper feed can be had, only hardy, thrifty animals can be profitably kept at Matanuska.

Sheep.—The station flock of sheep now numbers 10 head (6 ewes, 1 ram, 1 wether, 1 ewe lamb, and 1 ram lamb). The flock when turned at large was afforded protection from the weather by standing timber and sought the open shed only on stormy or extremely cold nights. Fodder of the White Jerusalem variety of artichoke formed the largest part of the sheep ration from January 1 to March 1. The animals greatly relish artichoke fodder. Shearing was done May 7. The weight of the clip was 110¾ pounds of first-grade wool. The ram fleece weighed 15 pounds.

APICULTURE

In May the station received two 3-pound packages of bees and two 3-frame nuclei from California and two full colonies from the northern part of Washington State. The package bees and the 3-frame nuclei were in better condition than the full colonies. The bees were active in the fields during nearly the whole of June and July and during about half of August. Fireweed bloomed only for a short

period and the drought caused many of the other honey plants to cease blooming. The honey flow was poor. Only one colony had sufficient honey to live through the winter. One of the full colonies swarmed August 5. All the colonies were housed during the winter in a basement room of the superintendent's cottage.

FAIRBANKS STATION

WEATHER CONDITIONS

The Fairbanks station is representative of the agricultural region of the Tanana Valley. Crop yields were reduced by the drought. The total precipitation for June, July, and August was only 2.6 inches. During July only 0.12 of an inch of rain fell, which is the lowest amount recorded for the station. The summer mean temperature was 5° above normal. The last killing frost in the spring occurred May 27 and the first killing frost in the fall September 1, the frost-free period lasting, therefore, 96 days.

FIG. 15.—Roots of trees laid bare by burning moss during the dry seasons

STATION IMPROVEMENTS

An aggregate of 12 acres of south-slope stump land was cleared. A fire guard was plowed around the area, a very good burn was obtained, and stumps which had been cut 12 years ago were then easily removed by means of mattock and handspike. (Figs 15 and 16.)

An open shed 30 by 16 feet was built adjoining the hay shed, to house the mowing machinery. A galvanized-iron roofing was placed on the granary, and the cottage roof was repaired.

To prevent soil erosion and carry off the surplus water from melting snows in spring, a 6-inch flume hose, 400 feet long, was connected with the tile drain at the upper end of the south-slope field.

Weeds, especially lamb's-quarters and horsetail (*Equisetum* sp.), were exterminated from some infested lands, the unusually dry season aiding in their destruction.

The station fields were accurately surveyed and platted in June. Blue prints 36 by 36 inches, giving the results of the survey, were made and fastened to the office wall.

GRAIN CROPS

Moisture is the limiting factor in the growth of small grains at Fairbanks. Only 1.48 inches of rain fell between the dates of plant-

FIG. 16.—Windfalls resulting from burning moss during the previous year

ing and harvesting. Since at least 9 inches of water, completely utilized, are required to produce a 30-bushel wheat crop, the difference of 7.52 inches had to be drawn by the crop from the subsoil. The total annual precipitation for the region is only about 8 inches. No evaporation data are on record.

Wheat.—A field of Ruby wheat, seeded May 20 at the rate of 90 pounds per acre, headed June 28, blossomed July 5, and was mature August 5. The crop yielded at the rate of 15 bushels per acre. The highest yield in the plats was at the rate of 23 bushels per acre. Last year the highest yield was at the rate of 33 bushels per acre.

Barley.—Hull-less barley was seeded at the rate of 90 pounds per acre. Dry weather forced the crop to mature early at the expense of yield. The crop matured July 30 and yielded at the rate of 25 bushels per acre. The highest yield of barley was at the rate of 32 bushels per acre.

Oats.—A strain of Canadian oats was seeded May 27 at the rate of 2½ bushels per acre. (Figs 17 and 18.) The crop was ripe August 4

FIG. 17.—Oats in shock, Fairbanks station

and yielded at the rate of 35 bushels per acre. Sixteen varieties of oats were grown on $\frac{1}{40}$-acre plats. Wisconsin Pedigree No. 7 was the highest yielder, producing at the rate of 40 bushels per acre.

FIG. 18.—Field of oats, Fairbanks station

LEGUMES

Peas.—On May 18 peas were drilled in rows 30 inches apart to permit cultivation. The crop blossomed June 20 and matured 40

days later. The vines were 18 inches long, produced three to five pods each, and yielded at the rate of 10 bushels per acre. On May 26 peas were drilled in rows 10 inches apart on six $\frac{1}{80}$-acre plats. The earliest-maturing varieties were ripe August 1. The maximum yield of the crop was at the rate of 16 bushels per acre.

Alfalfa.—All varieties of the yellow-flowered alfalfa (*Medicago falcata*) which were seeded in June, 1926, came through the winter with little injury. Grimm and Cossack make vigorous growth during their first year but invariably weaken in subsequent years. A 4½-acre plat which was seeded with *M. falcata* in June, 1925, gave a fair stand in 1926. Notwithstanding the careful preparation given the seed bed prior to planting, the young alfalfa plants were crowded out during the summer by a growth of horsetail (*Equisetum* sp.) and lamb's-quarters. The field was cross-disked, and the alfalfa as well as the weeds was apparently destroyed. The field was then given a top-dressing of commercial fertilizer in which nitrates predominated, and by the fall of 1927 the alfalfa had practically reestablished itself.

Vetch.—Vetch which was seeded five years ago produced a fine crop of seed this year. The plants were over 3 feet in height. The behavior of vetch at Fairbanks has been somewhat erratic. Some years the crop is heavy, and in others it is very light. Vetch usually is very slow in starting into growth in spring, and weeds are likely to establish themselves in the plat in the meantime. The crop which was seeded last year is now well established. The plants are being grown in rows to permit cultivation. A yellow-flowered leguminous plant with whorls instead of racemes of flowers, and short, broad seed pods was found growing in a small patch of the purple-flowered strain at Rampart several years ago. The yellow-flowered plant continued to flourish after the field had been abandoned and willows had begun to establish themselves. A few were dug and sent to Fairbanks for trial. The plants resemble the vetch which was found growing by N. E. Hansen on the dry steppes at Semipalatinsk, Siberia.[1]

POTATOES

Land for potatoes was plowed in the fall, disked in the spring, and given a top-dressing of commercial fertilizer containing nitrogen, phosphate, and potash in the proportions of 4:6:4, respectively, and applied at the rate of 400 pounds per acre. Planting was done May 31, and most of the plants were above ground June 19. As a result of level culture the sun burned some of the tubers during the summer, and the frost touched them in the fall before they were dug. The damage was slight, however, and was more than offset by the better yield resulting from level culture. Some of the lateral roots are severed, and there is considerable loss of soil moisture when hilling is practiced. Digging was begun September 8. The lowest-yielding variety produced at the rate of 109 bushels per acre, and the highest-yielding variety at the rate of 165 bushels per acre.

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[1] HANSEN, N. E. PLANT INTRODUCTIONS (1895–1927). S. Dak. Agr. Expt. Sta. Bul. 224, 64 p., illus. 1927.

HAY PRODUCTION

A mixture of oats and vetch in the ratio of 100 pounds oats to 10 pounds vetch was seeded for hay June 1, an end-gate seeder being used for the purpose. (Fig. 19.)

Some of the fields were treated with a commercial fertilizer containing nitrogen, phosphate, and potash in the proportions of 8:4:4, respectively, and applied at the rate of 300 pounds per acre. June was favorable to plant growth, but July was too dry for maximum yield. The average yield was slightly more than 1 ton of cured hay per acre.

ROTATION PLATS

In a series of crop rotations begun on sixty-eight $\frac{1}{10}$-acre plats in 1925, no difference in yield due to rotation was noted this year.

FIG. 19.—Curing hay, Fairbanks station

Drought and lack of soil fertility more than rotation influenced the succeeding crop.

HORTICULTURE

Cuthbert raspberry plants were heavily mulched in the fall and formed an abundance of fruit, most of which dried before maturing. The strawberry plants also were mulched in the fall and came through the winter in fine condition. The severe drought checked fruit production.

FLORICULTURE

The flowers near the superintendent's cottage bloomed profusely again this year. In the fall narcissus, tulip, and crocus bulbs were planted in a bed which was heavily mulched with straw. None of the narcissus or crocus survived the winter, whereas nearly all the tulips came through and bloomed.

LIVESTOCK

The station has on hand 2 work horses, 2 Hampshire hogs, 1 yak bull, 1 yak cow, 1 Galloway bull, 1 Galloway cow, and 8 Galloway-yak hybrids. Considerable progress has been made in attempts to produce hardy cattle by crossing the Asiatic yak with Galloway cattle. Two hybrid heifers, Nos. 7 and 8, were dropped by the herd during the year. Hybrid No. 7, born June 16, 1927, was sired by the pure-bred Galloway, Mollie Boy, out of a yak which was found dead in the stall on the third morning following the birth of the calf. Hybrid No. 8, born November 6, 1927, was sired by the Galloway, Mollie Boy, and is the second calf of Hybrid No. 1. Hybrid No. 8 is three-fourths Galloway and one-fourth yak. All the other hybrids were sired by a yak. Another yak cow at the station has been repeatedly bred, but apparently is sterile.

WEATHER REPORTS

Condensed meteorological reports

ALLAKAKET. Latitude 66° 34′, longitude 152° 44′. Miss A. K. Thompson, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	37	−42	−4.4	−25.8	−15.1	--------	--------	[1] 10	[1] 0	[1] 7
Februrary										
March	26	−55	6.0	−25.5	−9.8	0.50	9	15	5	11
April	35	−44	21.5	−10.1	5.7	.66	4	15	5	10
May	71	10	50.1	28.1	39.1	.25	3	12	13	6
June	83	37	73.5	46.1	59.8	4.22	11	10	10	10
July	80	35	72.3	45.8	59.0	1.94	8	6	13	12
August	76	31	64.3	41.2	52.8	2.66	18	5	4	22
September	59	11	45.5	23.1	34.3	.89	14	4	7	19
October	49	−33	27.6	7.2	17.4	.92	15	8	4	19
November	11	−54	−13.4	−30.1	−21.8	.21	4	3	6	21
December	20	−53	−5.1	−28.1	−16.7	.80	12	6	5	20

ANCHORAGE. Latitude 61° 13′, longitude 149° 52′. Marion E. Nichols, observer

January	44	−5	21.5	7.7	14.6	0.76	7	10	3	18
February	46	0	29.6	16.2	22.9	.95	4	8	6	14
March										
April	50	−8	36.8	20.0	28.4	.69	5	15	2	13
May	69	26	54.4	35.8	45.1	.34	4	[1] 9	[1] 8	[1] 12
June	69	37	62.8	45.0	53.9	1.06	10	[1] 7	[1] 5	[1] 16
July	71	44	65.8	51.6	58.7	.47	10	[1] 5	[1] 7	[1] 13
August	71	40	61.4	47.6	54.5	3.46	21	4	6	21
September	60	27	55.1	37.8	46.4	3.69	19	13	3	14
October	51	7	39.0	25.1	32.0	1.10	12	[1] 7	[1] 3	[1] 20
November	35	−18	20.0	5.1	12.6	.49	3	15	3	12
December	33	−8	20.4	8.1	14.2	.91	8	8	2	21

ANNEX CREEK. Latitude 58° 19′, longitude 134° 07′. Alaska-Gastineau Mining Co., observer

January	48	−2	31.7	17.8	24.8	5.19	14	12	3	16
February	58	14	40.8	28.5	34.6	5.22	19	6	7	15
March	48	22	42.2	30.4	36.3	6.09	23	5	8	18
April	58	12	44.3	27.1	35.7	4.48	15	11	6	13
May	75	31	58.2	38.5	48.4	3.91	18	12	7	12
June	76	34	66.4	45.5	56.0	1.59	13	9	11	10
July	82	40	70.9	45.5	58.2	.88	6	14	4	13
August	79	42	68.7	44.9	56.8	6.53	12	11	7	13
September	70	31	59.0	39.6	49.3	15.61	19	7	6	17
October	58	28	48.4	34.6	41.5	16.28	22	4	4	23
November	46	3	32.3	17.8	25.0	5.69	12	12	4	14
December	42	−6	27.4	15.5	21.4	9.80	15	15	3	13

[1] Record incomplete.

Condensed meteorological reports—Continued

BARROW. Latitude 71° 23′, longitude, 156° 17′. Weather Bureau, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	26	−39	−8.7	−24.3	−16.5	0.06	0			
February	4	−46	−13.6	−30.2	−21.9	.04	1			
March	27	−47	−9.3	−27.5	−18.4	.04	1			
April	15	−30	4.3	−15.6	−5.6	T.	0	11	4	15
May	45	3	30.3	18.0	24.2	T.	0	2	10	19
June	55	26	43.2	29.8	36.5	T.	0	1	13	16
July	78	25	54.4	36.2	45.3	1.37	10	5	10	16
August	62	27	42.8	31.6	37.2	.46	6	0	9	22
September	47	17	32.9	24.3	28.6	.02	2	2	11	17
October	32	−8	16.4	5.7	11.0	.22	6	0	6	25
November										
December										

BETHEL. Latitude 60° 45′, longitude 161° 47′. Weather Bureau, observer

January	36	−30			16.8	0.60	11			
February	50	−34			7.2	.01	1			
March	39	−20	14.9	−8.9	3.0			[1] 10	[1] 3	[1] 3
April	40	−12	25.4	6.9	16.2	.45	7	11	7	12
May	74	10	46.5	28.9	37.7	.60	7	2	10	19
June	70	34	59.4	43.0	51.2	.60	6	0	10	20
July	74	39	64.5	47.7	56.2	1.91	17	2	7	22
August	66	30	58.3	44.9	51.6	3.10	28	0	6	25
September	62	18	48.5	31.7	40.1	2.23	9	6	13	11
October	50	0	34.5	20.1	27.3	1.97	13	4	11	16
November	36	−27	15.7	−1.5	7.1	.82	7	16	6	8
December										

CALDER. Latitude 56° 10′, longitude 133° 27′. Harvey Sellers, observer

January	45	10	35.6	27.5	31.6	4.35	15	13	1	17
February	45	9	38.9	29.9	34.4	7.53	21	5	4	19
March	55	21	42.5	30.5	36.5	14.18	28	4	7	20
April	55	19	45.7	29.0	37.4	6.65	22	8	8	14
May	60	29	53.3	37.3	45.3	4.40	17	13	4	14
June	78	33	61.2	44.0	52.6	1.79	10	10	6	14
July	75	41	63.1	47.2	55.2	2.02	12	14	1	16
August	68	41	63.4	47.8	55.6	4.86	9	19	2	10
September	75	31	60.4	44.1	52.2	11.60	18	9	1	20
October	54	28	47.7	37.2	42.4	20.51	25	6	1	24
November	47	17	35.1	26.2	30.6	12.29	16	13	2	15
December	44	8	32.8	24.0	28.4	11.80	20	7	2	22

CHICKALOON. Latitude 61° 48′, longitude 148° 27′. Archie Lingo, observer

January	38	−16	19.0	0.0	9.5	0.73	4	21	8	2
February	44	−15	27.3	8.9	18.1	.67	4	8	13	7
March	53	−19	32.0	9.5	20.8	.53	3	7	13	11
April	51	1	36.9	16.6	26.8	.27	3	13	11	6
May	68	23	57.8	32.0	44.9	.33	4	16	13	2
June	73	32	66.0	40.7	53.4			[1] 8	[1] 6	[1] 9
July	76	34	69.7	44.7	57.2	1.02	6	[1] 15	[1] 8	[1] 7
August	76	29	66.3	41.7	54.0	.70	5	6	22	3
September	64	19	56.8	33.7	45.2	1.43	11	8	12	10
October	54	3	38.4	21.3	29.8	.36	3	12	7	12
November	35	−8	18.8	7.6	13.2	.04	1	14	7	9
December	39	−22	16.9	2.1	9.5	1.89	10	9	7	15

[1] Record incomplete.

Condensed meteorological reports—Continued

CHIGNIK. Latitude 56° 17′, longitude 158° 22′. Ivor Wallin, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	46	15	39.0	30.7	34.8	19.61	19	0	14	17
February	44	7	34.6	23.5	29.0	22.50	13	8	9	11
March	48	−6	25.9	12.3	19.1	.65	1	4	11	16
April	47	10	37.8	23.8	30.8	1.20	5	5	8	17
May	62	19	49.0	31.4	40.2	12.80	12	7	9	15
June	61	32	53.5	36.9	45.2	19.23	20	3	10	17
July	68	38	56.3	44.7	50.5	10.48	25	5	16	10
August	61	38	57.5	45.2	51.4	18.09	19	10	13	8
September	59	28	52.6	40.2	46.4	22.15	19	11	6	13
October	55	20	43.1	30.8	37.0	7.79	13	10	8	13
November	45	−3	33.5	23.2	28.4	3.84	9	12	9	9
December	48	2	34.5	23.2	28.8	16.10	15	5	10	16

CORDOVA. Latitude 60° 32′, longitude 145° 42′. Weather Bureau, observer

January	43	9	32.3	22.1	27.2	6.18	15	14	3	14
February	44	12	38.9	29.6	34.2	18.04	21	3	1	24
March	50	6	38.5	27.6	33.0	11.40	25	5	6	20
April	52	3	38.9	25.8	32.4	7.84	16	14	2	14
May	63	30	51.2	37.6	44.4	4.46	16	9	5	17
June	68	37	56.0	45.9	51.0	9.08	21	6	2	22
July	72	46	60.8	51.0	55.9	11.00	12	6	6	19
August	70	44	58.7	49.5	54.1	24.29	21	7	4	20
September	64	31	55.6	43.1	49.4	15.03	15	8	11	11
October	54	22	44.4	33.5	39.0	16.50	21	10	4	17
November	43	−2	30.4	19.4	24.9	4.49	8	17	3	10
December	39	9	31.9	22.1	27.0	8.94	15	9	4	18

DILLINGHAM. Latitude 59° 00′, longitude 158° 28′. W. N. Reed and J. B. Fleckenstein, observers

January	37	−8	28.3	17.6	23.0	2.72	7	4	1	26
February	42	−22	27.0	11.4	19.2	1.01	4	13	1	14
March	40	−18	30.1	1.0	15.6	.59	3	20	0	11
April	47	−3	36.1	18.9	27.5	.16	2	16	3	11
May	70	22	51.4	33.2	42.3	1.06	3	9	6	16
June	81	32	61.5	38.9	50.2	2.87	13	8	6	16
July	86	37	71.6	48.7	60.2	4.12	16	5	6	20
August	77	38	67.1	43.3	55.2	4.53	23	5	10	16
September	------	26	------	36.0	------	2.46	16	14	4	12
October	54	10	43.5	25.2	34.4	1.82	11	14	9	8
November	------	01	------	13.4	------	.85	6	19	6	5
December	48	2	29.2	14.9	22.0	3.83	16	[1] 3	[1] 4	[1] 23

DUTCH HARBOR. Latitude 53° 55′, longitude 166° 30′. Naval radio service, observer

January	49	20	42.3	33.5	37.9	13.32	23	------	------	------
February	46	15	34.9	23.8	29.4	------	------	------	------	------
March	46	12	31.3	21.9	26.6	3.40	16	------	------	------
April	48	21	41.2	29.6	35.4	4.12	12	------	------	------
May	66	27	45.8	32.8	39.3	------	------	------	------	------
June	60	33	50.9	39.5	45.2	5.09	13	------	------	------
July	66	40	58.6	44.0	51.3	1.65	11	------	------	------
August	70	37	60.7	44.2	52.4	1.25	7	------	------	------
September	70	30	56.2	40.1	48.2	2.44	10	------	------	------
October	62	24	47.2	32.8	40.0	------	------	------	------	------
November	53	20	44.6	33.8	39.2	------	------	------	------	------
December	52	22	43.2	30.9	37.0	------	------	------	------	------

[1] Record incomplete.

Condensed meteorological reports—Continued

EAGLE. Latitude 64° 46′, longitude 141° 12′. Weather Bureau, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	27	−56	−5.5	−23.4	−14.4	0.32	7	15	4	12
February	39	−51	16.4	−7.5	4.4	.17	2	11	5	12
March	40	−33	16.3	−8.0	4.2	.27	8	4	3	24
April	48	−37	28.7	5.7	17.2	.49	7	12	2	16
May	69	9	55.3	32.0	43.6	1.03	10	7	8	16
June	84	33	73.3	44.1	58.7	1.42	14.	7	5	18
July	88	38	79.5	48.3	63.9	1.07	10	14	5	12
August	85	30	70.0	43.8	56.9	2.45	15	6	6	19
September	67	12	48.9	31.8	40.4	1.71	12	6	4	20
October	46	−18	30.1	14.2	22.2	.56	8	8	5	18
November	30	−50	−4.0	−17.1	−10.6	.10	2	21	3	6
December	21	−61	−7.9	−23.9	−15.9	.81	11	15	1	15

FAIRBANKS. Latitude 64° 51′, longitude 147° 52′. G. W. Gasser, observer

January	40	−40	7.1	−11.1	−2.0	1.03	11	14	3	14
February	42	−31	16.0	−6.6	4.7	.26	6	10	7	11
March	46	−25	15.0	−7.5	3.8	.57	8	7	8	16
April	50	−27	32.0	7.0	19.5	.07	2	15	3	12
May	73	21	58.8	33.7	46.2	.32	3	11	7	13
June	85	40	72.9	46.6	59.8	1.28	7	12	5	13
July	88	39	77.7	48.7	63.2	.12	5	11	11	9
August	84	32	69.6	42.6	56.1	1.20	11	3	5	23
September	65	17	51.3	28.6	40.0	1.01	10	7	3	20
October	42	−18	29.0	11.4	20.2	.69	6	9	6	16
November	26	−50	−3.1	−19.7	−11.4	.21	3	15	2	13
December	28	−32	6.5	−11.5	−2.5	.97	7	11	7	13

FALSE PASS. Latitude 54° 50′, longitude 163° 40′. Joseph E. Nasenius, observer

January	44	28	41.6	35.6	38.6			[1] 2	[1] 2	[1] 18
February	44	10	34.6	25.0	29.8	11.37	14	4	3	21
March	42	2	26.0	16.3	21.2	2.85	5	5	3	23
April	48	17	36.8	27.5	32.2	2.60	6	7	1	22
May	55	26	43.8	34.0	38.9	7.90	12	4	5	22
June	55	36	49.5	39.7	44.6	8.81	16	0	11	19
July	65	43	54.5	45.9	50.2	3.43	17	1	3	27
August										
September	55	30	52.1	43.0	47.6	9.25	15	4	2	24
October	54	12	44.2	32.1	38.2	4.10	9	3	5	23
November	48	26	39.0	29.9	34.4	3.05	7	3	2	25
December										

FORT YUKON. Latitude 66° 34′, longitude 145° 18′. Weather Bureau, observer

January	40	−51	−11.5	−29.4	−20.4	0.17	4	24	1	6
February	24	−43	−.3	−20.4	−10.4	.14	4	17	3	8
March	30	−30	6.5	−10.1	−1.8	.25	8	11	1	19
April	43	−41	26.2	−1.9	12.2	.03	1	15	5	10
May	72	11	55.7	31.5	43.6	.10	3	15	5	11
June	83	35	73.8	50.7	62.2	1.00	5	17	4	9
July	85	46	76.2	54.6	65.4	1.42	7	19	7	5
August	80	29	64.3	45.2	54.8	2.38	12	9	7	15
September	67	17	45.0	29.7	37.4	1.13	10	6	5	19
October	38	−12	24.8	10.2	17.5	.30	5	12	2	17
November	15	−52	−13.4	−24.9	−19.2	.03	1	25	2	3
December	12	−50	−13.9	−30.3	−22.1	.20	3	23	3	5

[1] Record incomplete.

Condensed meteorological reports—Continued

HAINES. Latitude 59° 13′, longitude 135° 34′. E. E. Bromley, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	41	4	29.4	16.8	23.1	3.22	12	14	2	15
February	49	6	33.9	23.2	28.6	3.15	17	4	5	19
March	49	17	39.8	28.4	34.1	4.91	21	6	8	17
April	52	6	39.1	25.4	32.2	2.29	12	11	8	11
May	73	28	56.9	39.7	48.3	1.60	8	11	8	12
June	75	36	65.4	45.0	55.2	.18	7	11	7	12
July	84	41	69.5	50.8	60.2	1.06	8	18	4	9
August	75	38	65.6	46.6	56.1	1.44	8	15	6	10
September	70	32	56.1	42.6	49.4	9.36	17	9	6	15
October	56	22	44.7	34.4	39.6	8.64	21	3	8	20
November	44	−7	27.5	15.0	21.2	1.78	10	16	3	11
December	38	−7	24.8	10.9	17.8	7.08	12	15	2	14

HOLY CROSS. Latitude 62° 16′, longitude 159° 50′. Holy Cross Mission, observer

January	38	−36	16.0	0.6	8.3	3.54	14	9	6	16
February	44	−42	12.9	−2.4	5.2	.15	4	19	6	3
March	37	−35	9.7	−11.1	−.7	.46	10	21	4	6
April	44	−16	27.9	6.5	17.2	.55	5	13	8	9
May	71	15	50.9	31.1	41.0	1.24	3	16	7	8
June	76	33	63.6	43.5	53.6	2.23	5	25	3	2
July	76	43	66.5	48.9	57.7	2.92	11	15	8	8
August	70	30	59.5	45.1	52.3	5.02	14	7	10	14
September	56	18	46.7	30.1	38.4	3.59	13	16	2	12
October	45	−4	32.1	18.3	25.2	1.33	9	8	9	14
November	23	−34	7.1	−4.9	1.1	.54	3	7	10	13
December	38	−19	13.5	−.3	6.6	2.08	8	2	10	19

HYDABURG. Latitude 55° 17′, longitude 132° 38′. Charles E. Smith, observer

January	50	−1	42.7	22.5	32.6	1.25	11	21	3	7
February	49	2	41.0	29.7	35.4	6.67	22	6	7	15
March	55	20	45.7	31.4	38.6	8.68	24	6	6	19
April	58	22	46.8	33.4	40.1	5.75	15	8	8	14
May	62	30	54.8	38.7	46.8	5.14	9	18	8	5
June	73	40	63.8	47.7	55.8	1.95	10	15	8	7
July	85	50	69.6	55.4	62.5	.40	3	23	8	0
August	80	44	69.9	50.9	60.4	3.65	9	21	4	6
September	81	36	59.2	46.3	52.8	7.77	16	12	10	8
October	54	31	47.9	41.0	44.4	13.20	25	6	4	21
November	49	13	42.8	27.4	35.1	4.72	12	9	12	9
December	49	10	38.8	24.9	31.8	4.07	13	15	9	7

IGLOO. Latitude 65° 08′, longitude 165° 04′. Albert Schmidt and Leo Lightle, observers

January	36	−46	12.9	−12.5	0.2	0.66	9	9	10	12
February	49	−56	5.6	−13.5	−4.0	------	------	[1] 12	[1] 11	[1] 3
March	39	−38	−2.5	−24.0	−13.2	.21	3	15	15	1
April	32	−34	15.6	−8.6	3.5	.34	8	11	13	6
May	64	−12	38.4	21.2	29.6	.31	4	4	13	14
June	75	33	62.9	41.0	52.0	1.34	11	8	16	6
July	66	39	60.9	44.5	52.7	------	------	[1] 4	[1] 4	[1] 11
August	------	------	------	------	------	------	------	------	------	------
September	50	17	42.2	28.7	35.4	1.25	9	[1] 9	[1] 12	[1] 7
October	43	−12	29.0	14.8	21.9	.37	13	9	6	16
November	37	−45	13.8	−3.7	5.0	.21	6	12	6	12
December	------	------	------	------	------	------	------	------	------	------

[1] Record incomplete.

Condensed meteorological reports—Continued

JUNEAU. Latitude 58° 18′, longitude 134° 24′. Weather Bureau, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	46	13	33.4	25.1	29.2	3.76	16	11	3	17
February	48	10	36.5	27.4	32.0	4.34	20	3	2	23
March	46	23	39.7	32.1	35.9	8.65	22	3	1	27
April	50	15	39.3	28.6	34.0	4.01	16	5	4	21
May	69	31	53.8	39.4	46.6	3.89	19	6	7	18
June	73	38	62.3	47.6	55.0	1.86	16	3	6	21
July	83	45	66.7	51.0	58.8	1.40	15	8	9	14
August	76	47	65.7	51.0	58.4	5.46	14	7	6	18
September	67	36	56.4	44.9	50.6	10.39	20	6	4	20
October	52	31	45.6	38.2	41.9	13.64	26	3	1	27
November	43	6	31.7	24.1	27.9	3.57	15	13	2	15
December	40	6	29.2	20.8	25.0	7.48	19	10	4	17

KATALLA. Latitude 60° 12′, longitude 144° 33′. Mrs. B. H. White, observer

January	41	8	33.0	22.3	27.6	2.70	16	3	13	15
February	45	13	39.1	29.5	34.3	7.65	21	0	5	23
March	46	14	37.8	27.9	32.8	5.50	27	3	5	23
April	49	7	38.1	25.9	32.0	5.47	16	9	6	15
May	59	31	50.2	37.0	43.6	5.40	17	3	8	20
June	68	36	56.0	44.9	50.4	6.27	19	4	5	21
July	72	41	61.4	49.1	55.2	7.76	14	6	7	18
August	71	41	59.4	48.0	53.7	15.48	19	5	8	18
September	65	31	55.5	42.2	48.8	13.40	17	5	5	20
October										
November										
December										

KENNECOTT. Latitude 61° 29′, longitude 142° 57′. Kennecott Copper Corporation, observer

January	33	−23	10.2	−3.8	3.2	0.66	6	15	4	12
February	56	−22	25.7	9.3	17.5	.23	4	8	9	11
March	41	−5	30.6	12.9	21.8	.05	1	10	7	14
April	46	−18	33.5	15.2	24.4	.94	6	10	5	15
May	63	18	53.0	31.5	42.2	1.46	6	11	6	14
June	70	34	63.0	39.1	56.0	1.41	7	5	10	15
July	74	34	66.9	41.0	54.0	.41	6	14	5	12
August	69	32	59.1	39.2	49.2	3.30	12	6	5	20
September	62	26	50.7	33.5	42.1	4.98	15	10	3	17
October	46	−1	35.5	19.2	27.4	1.43	9	10	4	17
November	37	−28	5.4	−7.9	−1.2	.68	5	18	2	10
December	33	−28	9.5	−3.8	2.8	1.48	7	7	7	17

KETCHIKAN. Latitude 55° 20′, longitude 131° 37′. W. H. Dickey and H. G. Anderson, observers

January	46	8	37.1	25.1	31.1	14.05	18	10	3	18
February	48	9	42.4	30.0	36.2	14.38	18	5	3	20
March	55	25	43.3	30.9	37.1	17.82	25	6	5	20
April	60	22	46.0	31.2	38.6	10.23	19	7	5	18
May	66	32	54.8	38.5	46.6	5.91	15	11	8	12
June	77	42	62.7	47.0	54.8	3.34	16	6	9	15
July	86	46	69.3	50.3	59.8	4.29	13	18	2	11
August	82	39	70.1	51.0	60.6	9.85	12	19	2	10
September	79	34	59.8	49.8	54.8	16.36	22	4	2	24
October	58	29	50.5	37.1	43.8	18.05	27	3	5	23
November	59	11	40.8	22.6	31.7	7.20	16	14	6	10
December	46	6	35.1	22.4	28.8	10.81	19	7	1	23

Condensed meteorological reports—Continued

KODIAK. Latitude 57° 48′, longitude 152° 22′. Experiment station, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	44	19	39.0	29.8	34.4	2.74	16	9	5	17
February	57	9	38.1	29.3	33.7	8.81	22	4	3	21
March	53	3	34.4	22.1	28.2	3.52	16	13	3	15
April	49	12	39.9	27.8	33.8	2.96	15	12	7	11
May	66	30	48.9	37.7	43.3	4.68	13	8	4	19
June	62	37	52.5	42.0	47.2	9.00	23	2	5	23
July	65	35	56.1	44.4	50.2	6.60	25	3	4	24
August	65	42	56.8	46.5	51.6	6.73	23	2	11	18
September	59	36	53.5	43.5	48.5	5.21	17	6	4	20
October	56	17	43.3	32.0	37.6	2.55	14	7	7	17
November	46	3	34.9	24.5	29.7	1.02	6	13	7	10
December	44	21	37.0	28.5	32.8	5.65	18	3	5	23

LATOUCHE. Latitude 60° 03′, longitude 147° 55′. Kennecott Copper Corporation, observer

January	41	19	36.9	27.5	32.2	9.82	18	12	5	14
February	52	21	39.1	30.4	34.8	28.61	22	3	5	20
March	52	15	39.1	28.2	33.6	20.48	25	7	11	13
April	54	12	43.0	27.7	35.4	8.01	13	14	5	11
May	67	32	51.9	38.0	45.0	11.32	16	9	4	18
June	65	40	55.7	44.6	50.2	10.05	20	7	5	18
July	64	42	59.5	49.7	54.6	7.22	15	8	4	19
August	71	43	60.1	48.7	54.4	22.23	21	6	3	22
September	67	32	58.5	43.8	51.2	12.45	17	11	3	16
October	57	24	47.8	34.3	41.0	25.96	26	8	3	20
November	47	9	38.6	24.4	31.5	10.62	12	16	2	12
December	42	19	36.1	26.8	31.4	17.40	18	11	4	16

McKINLEY PARK. Latitude 63° 44′, longitude 148° 55′. H. P. Karstens, observer

January	36	−27	14.5	−6.4	4.0	1.14	8	19	4	8
February	48	−31	26.4	3.8	15.1	.11	3	16	7	5
March	49	−25	17.4	−4.5	6.4	.88	8	13	8	10
April	43	−25	33.2	5.7	19.4	.50	1	[1] 17	[1] 4	[1] 5
May	66	14	52.8	30.5	41.6	T.	0	18	9	4
June	83	34	69.7	41.1	55.4	1.06	-------	[1] 8	[1] 3	[1] 4
July	85	39	75.4	44.5	60.0	1.20	3	[1] 19	[1] 8	[1] 3
August	78	33	67.1	43.2	55.2	1.61	7	13	11	7
September	59	18	51.2	29.4	40.3	.53	4	[1] 10	[1] 9	[1] 10
October	69	−13	32.5	8.9	20.7	.48	4	[1] 8	[1] 11	[1] 7
November	29	−34	6.1	−7.1	−.5	.11	3	20	4	6
December	35	−24	11.5	−5.0	3.2	.83	6	16	9	6

MATANUSKA. Latitude 61° 30′, longitude 149° 15.′ Experiment station, observer

January	42	−13	20.4	2.4	11.4	0.93	6	9	6	16
February	49	−8	29.5	14.0	21.8	.95	4	6	9	13
March	45	−9	31.9	13.7	22.8	.92	8	10	10	11
April	50	−5	37.9	19.9	28.9	.37	2	13	8	9
May	70	27	57.8	35.1	46.4	.51	4	11	9	11
June	71	35	65.3	44.0	54.6	.75	6	9	12	9
July	77	40	70.1	48.9	59.5	.55	5	10	14	7
August	74	35	63.7	45.6	54.6	1.94	13	2	12	17
September	62	26	56.1	37.1	46.6	1.69	12	7	6	17
October	50	7	41.2	23.1	32.2	1.32	9	5	9	17
November	39	−22	17.5	1.5	9.5	.10	1	15	6	9
December	43	−15	19.8	3.9	11.9	1.22	8	9	5	17

[1] Record incomplete.

Condensed meteorological reports—Continued

NOME. Latitude 64° 30′, longitude 165° 24′. Weather Bureau, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	33	−26	21.2	3.5	12.4	0.28	10	9	12	10
February	44	−41	12.8	−3.3	4.8	.10	3	17	9	2
March	33	−28	6.0	−12.8	−3.4	T.	0	25	5	1
April	32	−21	18.9	−.7	9.1	.49	5	6	16	8
May	61	4	39.4	26.0	32.7	.87	10	1	17	13
June	76	28	56.0	38.8	47.4	2.88	14	0	17	13
July	68	35	57.3	43.4	50.4	2.15	12	6	11	14
August	71	27	58.3	44.0	51.2	2.51	16	3	20	8
September	57	18	43.7	27.7	35.7	1.04	9	9	15	6
October	39	0	30.2	17.5	23.8	1.08	6	8	15	8
November	31	−26	18.3	4.9	11.6	.87	7	13	7	10
December	34	−12	17.6	6.5	12.0	1.41	9	13	9	9

NOORVIK. Latitude 66° 50′, longitude 161° 00′. Mrs. R. M. Chance, observer

January	21	−38	6.9	−10.1	−1.6	1.66	4	[1] 19	[1] 3	[1] 7
February	34	−47	−.9	−22.1	−11.5	.20	1	[1] 19	[1] 2	[1] 3
March	35	−38	−.5	−23.4	−12.0	.62	2	22	2	7
April	25	−22	16.2	−8.6	3.8	.52	6	[1] 15	[1] 3	[1] 5
May	68	−1	44.5	23.2	33.8	.17	2	[1] 14	[1] 4	[1] 10
June [2]	85	34	67.0	43.4	55.2	1.80	8	[1] 17	[1] 4	[1] 8

PETERSBURG. Latitude 56° 50′, longitude 132° 57′. F. R. Havens, observer

January	47	4	35.4	21.9	28.6	3.33	10	12	9	10
February	47	13	38.0	26.8	32.4	6.43	14	3	5	20
March	53	21	42.6	29.9	36.2	11.10	20	3	8	20
April	59	17	45.1	29.5	37.3	5.11	11	11	10	9
May	69	30	55.3	37.1	46.2	5.65	13	11	6	14
June	74	33	65.0	44.6	54.8	2.49	9	10	10	10
July	84	40	68.8	46.9	57.8	2.94	7	14	6	11
August	76	41	67.0	46.8	56.9	6.58	10	17	3	11
September	65	30	59.3	40.9	50.1	11.96	17	9	1	20
October	57	28	49.9	36.2	43.0	14.93	21	3	2	26
November										
December										

RAMPART. Latitude 65° 30′, longitude 150° 15′. Clement Anderson, observer

January	40	−31	−4.2	−17.7	−11.0	0.67	6	20	2	9
February	29	−38	2.0	−12.4	−5.2	.18	3	15	8	5
March	35	−30	6.2	−7.8	−.8	.18	2	17	8	6
April	48	−31	24.6	1.6	13.1	.22	2	18	7	5
May	75	16	54.1	30.5	42.3	.12	1	12	12	7
June	83	37	71.7	45.5	58.6	1.39	7	14	10	6
July	86	38	73.1	46.6	59.8	1.10	5	19	9	3
August	75	31	63.4	42.2	52.8	2.13	9	9	9	13
September	54	20	44.0	28.1	36.0	1.76	10	9	3	18
October	44	−17	25.8	12.5	19.2	.37	3	8	2	21
November	19	−47	−8.6	−19.2	−13.9	T.	0	19	1	10
December	23	−42	−5.8	−18.1	−12.0	.63	5	12	6	13

[1] Record incomplete.

[2] Station closed.

Condensed meteorological reports—Continued

ST. MICHAEL. Latitude 63° 29′, longitude 162° 01′. P. J. Evans, observer.

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	37	−33	22.3	7.0	14.6					
February	47	−32	12.4	−.8	5.8					
March	35	−29	3.0	−13.1	−5.0			22	0	9
April	32	−22	29.9	−.1	14.9	.50	3	12	0	18
May	62	−1	40.4	25.7	33.0	.10	2	13	0	18
June	67	33	56.0	41.4	48.7	.09	2	11	1	18
July										
August										
September	50	22	43.6	33.1	38.4	.19	4	11	1	18
October	42	−12	32.3	22.6	27.4	.60	3	3	2	26
November	30	−23	17.6	4.4	11.0			16	0	14
December	35	−9	17.0	6.5	11.8	.92	5	6	0	25

ST. PAUL ISLAND. Latitude 57° 15′, longitude 170° 10′. Weather Bureau, observer

January	41	19	37.6	32.8	35.2	0.39	7	2	9	20
February	40	6	28.0	20.8	24.4	.33	15	2	6	20
March	36	−4	17.9	9.5	13.7	.20	5	6	5	20
April	35	3	27.5	19.1	23.3	.43	5	4	7	19
May	43	18	36.1	28.5	32.3	.98	14	0	2	29
June	52	32	44.1	34.7	39.4	2.51	10	2	4	24
July	55	38	49.4	40.6	45.0	2.41	13	4	3	24
August	54	40	49.9	43.3	46.6	1.48	12	0	4	27
September	50	33	45.6	39.6	42.6	3.23	17	3	7	20
October										
November										
December										

SHAW ISLAND. Latitude 58° 12′, longitude 136° 15′. Mrs. Geo. R. Shotter, observer

January	49	20	37.5	27.5	32.5	12.85	18	15	6	10
February	44	9	38.5	28.0	33.2	15.67	19	8	12	8
March	53	24	41.3	31.7	36.5	5.04	9	[1] 2	12	[1] 15
April	54	14	42.4	28.2	35.3	4.38	15	10	15	5
May	65	33	51.9	38.3	45.1	2.10	15	12	10	9
June	69	36	58.8	43.0	50.9	1.64	12	7	7	16
July	71	44	60.9	47.8	54.4	1.15	8	10	10	11
August	69	42	61.1	46.2	53.6	5.33	15	4	13	14
September	58	38	54.6	44.9	49.8	12.88	19	5	11	14
October	55	32	46.4	37.5	42.0	12.52	25	4	8	19
November	46	14	37.2	27.6	32.4	5.35	12	5	10	15
December	42	5	34.9	25.8	30.4	11.55	17	4	14	13

SITKA. Latitude 57° 03′, longitude 135° 19′. Experiment station, observer

January	49	18	41.3	28.3	34.8	3.88	18	13	3	15
February	51	14	44.0	31.5	37.8	5.32	17	4	10	14
March	59	21	43.6	31.8	37.7	12.80	25	4	10	17
April	54	17	45.2	30.9	38.0	4.16	19	8	8	14
May	65	33	54.3	39.8	47.0	2.03	16	7	5	19
June	68	39	61.6	47.6	54.6	1.90	17	7	7	16
July	74	45	64.5	51.2	57.8	.72	13	[1] 15	[1]3	[1] 12
August	73	47	67.3	52.5	59.9	3.14	16	10	12	9
September	77	37	62.0	46.6	54.3	13.46	21	8	6	16
October	61	32	50.7	39.8	45.2	14.47	25	[1] 8	[1]4	[1] 18
November	51	18	42.4	26.1	34.2	7.12	13	13	8	9
December	45	12	37.9	24.2	31.0	10.12	20	9	6	16

[1] Record incomplete.

Condensed meteorological reports—Continued

SKAGWAY. Latitude 59° 27′, longitude 135° 19′. F. J. Vandewall and P. I. Dahl, observers

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	43	4	27.9	18.4	23.2	0.67	5	12	3	16
February	48	4	35.0	24.4	29.7	1.02	10	5	4	19
March	49	21	41.1	30.3	35.7	2.36	9	4	11	16
April	54	7	41.6	26.5	34.0	.96	9	7	5	18
May	79	25	59.4	39.2	49.3	1.19	9	10	10	11
June	77	32	56.6	45.8	56.2	.08	4	10	12	8
July	86	40	71.5	49.8	60.6	.46	6	16	3	12
August	78	39	67.5	48.3	57.9	1.67	10	9	12	10
September	76	30	59.3	41.1	50.2	6.97	17	11	11	8
October	60	23	46.9	35.5	41.2	5.23	13	4	11	16
November	45	−5	27.3	17.9	22.6	.40	3	19	7	4
December	40	−1	25.5	13.4	19.4	2.52	9	16	10	5

TALKEETNA. Latitude 62° 19′, longitude 150° 16′. P. W. McCarthy, observer

January	30	−25	20.0	−3.3	8.4	2.23	9	11	4	16
February	46	−18	29.0	8.8	18.9	1.73	6	7	2	19
March	44	−23	32.7	9.5	21.1	2.44	13	10	3	18
April	50	−22	37.5	14.3	25.9	2.09	8	16	3	11
May	75	22	58.9	32.6	45.8	1.54	10	11	8	12
June	78	32	68.7	39.7	54.2	2.04	9	6	5	19
July	79	41	71.5	48.0	59.8	3.17	5	9	3	19
August	78	32	65.4	43.8	54.6	4.03	22	1	5	25
September	68	20	57.7	35.2	46.4	4.07	16	5	7	18
October	55	−8	39.3	18.5	28.9	2.77	7	5	6	20
November	38	−30	20.8	−4.0	8.4	.28	2	21	1	8
December	32	−22	15.7	−1.5	7.1	1.58	7	12	5	14

TANANA. Latitude 65° 10′, longitude 152° 06′. Weather Bureau, observer

January	40	−42	4.3	−11.7	−3.7	0.61	12	17	6	8
February	35	−49	6.2	−10.8	−2.3	.44	6	14	11	3
March	32	−38	10.4	−15.0	−2.3	.31	10	17	8	6
April	43	−21	26.4	4.4	15.4	.20	8	14	12	4
May	74	19	55.0	32.5	43.8	.73	9	7	18	6
June	84	36	73.2	46.8	60.0	1.65	14	9	18	3
July	83	34	73.1	48.0	60.6	1.44	18	10	15	6
August	76	30	63.8	43.8	53.8	2.69	20	3	18	10
September	59	16	45.1	28.6	36.8	1.74	14	7	10	13
October	45	−17	26.5	12.2	19.4	.71	14	11	8	12
November	17	−45	−5.0	−17.8	−11.4	.13	2	21	7	2
December	21	−37	.5	−11.7	−5.6	.88	12	16	7	8

VALDEZ. Latitude 61° 07′, longitude 146° 16′. J. A. McGilvray, observer

January		1		13.8				10	0	21
February		1		18.8				[1] 4	[1] 0	[1] 20
March		3		21.4				[1] 4	[1] 0	[1] 18
April		0		20.4						
May	64	31	49.6	36.4	43.0			[1] 8	[1] 3	[1] 8
June	67	33	55.7	40.2	48.0	3.29	15	10	5	15
July	69	40	60.0	47.0	53.5	3.28	16	13	2	16
August	70	38	56.8	45.5	51.2	9.88	24	9	1	21
September	62	29	52.9	37.9	45.4	7.85	18	14	5	11
October	55	12	40.9	28.4	34.6	4.31	18	8	5	18
November	36	−9	23.7	11.1	17.4	1.30	6	[1] 20	[1] 1	[1] 8
December										

[1] Record incomplete.

Condensed meteorological reports—Continued

WALES. Latitude 65° 36′, longitude 168° 04′. C. M. Garber and S. D. Mazen, observers

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	F.	*°F.*	*°F.*	*°F.*	*°F.*	*Inches*				
January	40	−27	13.9	−7.9	3.0	1.28	6	11	4	16
February	49	−34	5.6	−12.4	−3.2	1.93	7	13	6	9
March	38	−32	1.3	−17.1	−7.9	.38	4	20	4	7
April	30	−16	16.6	−.3	8.2	.55	7	10	3	17
May	57	1	33.0	22.0	27.5	.31	6	4	8	19
June	64	30	49.8	35.7	42.8	1.61	5	7	8	15
July	69	35	53.8	41.2	47.5	1.36	5	8	8	15
August	63	33	53.7	43.6	48.6	0.97	11	5	6	20
September	48	29	40.9	32.9	36.9	1.44	19	5	10	15
October	50	−2	32.9	23.4	28.2	.74	9	2	1	28
November	37	−7	26.6	14.0	20.3	.39	6	4	1	25
December	35	−20	16.0	3.1	9.6	1.00	2	13	3	15

WHALE ISLAND. Latitude 57° 58′, longitude 152° 46′. B. C. Parker, observer

January	-------	11	-------	28.2	-------	2.89	9	17	2	12
February	50	2	38.1	25.7	31.9	6.58	22	8	5	15
March	52	−9	34.5	16.0	25.2	2.57	16	14	4	13
April	49	3	40.0	28.8	34.4	1.89	16	17	4	9
May	67	20	51.1	35.3	43.2	4.83	10	14	6	11
June	68	32	54.1	41.5	47.8	7.53	15	6	11	13
July	66	38	56.5	46.4	51.4	5.29	18	4	4	23
August	63	38	57.7	45.6	51.6	4.53	16	[1] 7	[1] 16	[1] 7
September	63	30	53.5	41.6	47.5	5.57	14	11	9	10
October	54	20	43.3	30.2	36.8	4.98	14	9	12	10
November	45	6	34.7	21.3	28.0	1.62	5	14	9	7
December	44	10	35.8	23.9	29.8	7.08	14	13	4	14

WHITE MOUNTAIN. Latitude 64° 40′, longitude 162° 20′. T. P. McCollister, observer

January	42	−38	27.6	−4.9	11.4	2.09	10	[1] 13	[1] 6	[1] 11
February	51	−44	14.2	−12.2	1.0	.09	3	[1] 22	[1] 1	[1] 3
March	34	−32	7.4	−12.1	−2.4	.13	6	24	3	4
April	40	−30	33.0	4.2	18.6	.24	6	18	4	8
May	75	8	48.6	31.5	40.0	.06	2	20	9	2
June	80	35	69.8	46.3	58.0	.26	6	19	5	6
July	80	37	70.4	45.2	57.8	1.59	11	15	10	6
August	79	32	70.0	41.9	56.0	1.22	10	17	7	7
September	75	20	55.9	33.6	44.8	.63	6	15	4	6
October	47	−4	36.6	10.8	23.7	.07	5	[1] 12	[1] 1	[1] 10
November	33	−32	21.9	−8.7	6.6	.05	2	22	5	3
December	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

WONDER LAKE. Latitude 63° 28′, longitude 150° 52′. Mrs. Paula Anderson, observer

January	45	−45	16.5	−10.7	2.9	0.79	7	12	5	14
February	50	−38	23.8	−6.3	8.8	.58	3	15	5	8
March	47	−35	17.7	−16.5	.6	.21	4	10	9	12
April	62	−30	39.5	−3.8	17.8	.31	6	18	3	9
May	69	−3	57.0	22.9	40.0	.83	7	15	7	9
June	83	24	69.0	35.8	52.4	2.32	11	12	14	4
July	83	32	74.5	41.7	58.1	1.05	7	13	15	3
August	76	32	66.3	39.2	52.8	3.07	10	8	15	8
September	64	11	48.4	24.1	36.2	.81	8	9	5	16
October	54	−17	32.5	3.9	18.2	.71	8	12	7	12
November	46	−56	9.2	−20.1	−5.4	.13	3	23	2	5
December	32	−33	16.8	−2.5	7.2	.77	4	10	7	14

[1] Record incomplete.

Condensed meteorological reports—Continued

WRANGELL. Latitude 56° 28′, longitude 132° 23′. A. Rasmussen, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	44	3	32.9	22.1	27.5			[1] 3	[1] 2	[1] 10
February	49	9	38.9	27.8	33.4	5.94	19	5	6	17
March	52	21	44.2	30.6	37.4	9.47	23	5	7	19
April	57	19	45.9	29.6	37.8	4.76	18	11	6	13
May										
June	74	33	69.6	45.7	57.6	2.24	11	[1] 11	[1] 5	[1] 7
July		38		47.9		2.84	12	[1] 16	[1] 5	[1] 9
August	83	40	76.5	46.3	61.4	4.22	11	19	5	7
September	72	31	60.0	43.8	51.9	9.93	21	9	0	21
October	55	30	49.8	37.2	43.5	15.00	26	1	5	25
November	47	11	35.7	22.6	29.2	6.85	14	14	2	14
December	43	1	31.0	19.5	25.2	6.62	16	9	4	18

YAKUTAT. Latitude 59° 33′, longitude 139° 44′. E. M. Axelson, observer

January	40	17	33.6	25.1	29.4	4.58	10	17	0	14
February	44	15	37.5	29.4	33.4	10.92	17	2	1	25
March		23	36.0	29.1	32.6			[1] 2	[1] 0	[1] 19
April	52	10	40.0	27.7	33.8	6.05	12	[1] 10	[1] 2	[1] 15
May	55	28	49.0	36.0	42.5	3.80	11	11	5	15
June	64	36	56.1	44.9	50.5	3.01	12	8	3	19
July	62	38	59.0	48.2	53.6	4.91	9	14	5	12
August	66	40	59.3	49.2	54.2	10.79	17	10	3	18
September	58	34	54.0	42.6	48.4	16.25	18	10	3	17
October	55	25	44.5	34.6	39.6	19.16	24	6	1	24
November	44	12	33.7	22.8	28.2	8.13	10	15	2	13
December	42	11	35.0	25.8	30.4	10.09	13	7	2	22

[1] Record incomplete.